PATENT ABSTRACTS OF JAPAN

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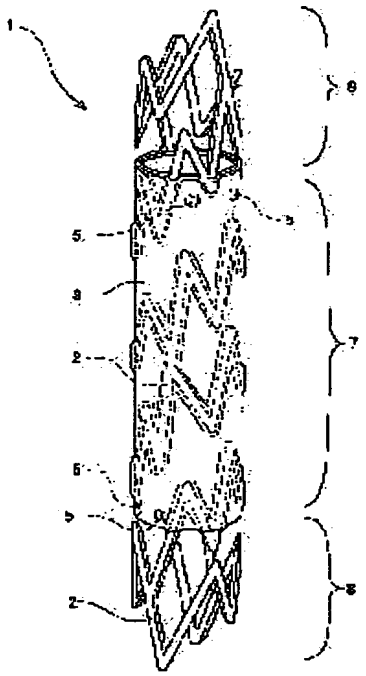
(54) STENT FOR STAYING IN VIVO

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a stent for staying in vivo, which is of a covered type having sufficient X-ray contrasting property without enlarging a columnar portion of a stent body.
SOLUTION: The stent 1 for staying vivo is formed in an approximately cylindrical shape by using a frame structure 4. The stent 1 comprises the stent body 2, a cylindrical cover 3 for covering the side face of the stent body 2, and a X-ray contrasting marker 5 provided on at least a portion of the cylindrical cover 3 without contacting the stent body 2.



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CLAIMS

[Claim(s)]
[Claim 1] It is the stent for detention in the living body characterized by being the stent for detention in the living body which is formed in the shape of a cylindrical shape, and has opening on a side face, and equipping this stent with the marker for X-ray imaging prepared in this tubed covering so that a stent body, tubed covering which covers the side face of this stent body, and said stent body might not be contacted.
[Claim 2] Said marker is stent [according to claim 1] for detention in the living body prepared in the edge of said tubed covering.
[Claim 3] Said marker is stent [according to claim 1] for detention in the living body prepared in the both ends of said tubed covering, respectively.
[Claim 4] Said stent for detention in the living body is stent [according to claim 1 to 3] for detention in the living body which is what is compressed at the time of living body interpolation close, reduces the diameter of, and is restored to the configuration before contraction at the time of detention in the living body.
[Claim 5] Said marker is stent [according to claim 1 to 4] for detention in the living body which is the tabular object, spherical object, or pillar-shaped object formed with the X-ray imaging nature metal.
[Claim 6] For said marker, 5 is [claim 1 by which the encapsulation is carried out with said tubed covering thru/or] the stent for detention of a publication in the living body either.
[Claim 7] It is the stent [according to claim 1 to 6] for detention in the living body by which said tubed covering consists of an inside side film and an external surface side film by which a laminating is carried out to this inside side film, and said marker is arranged between said inside side film and said external surface side film.
[Claim 8] It is the stent [according to claim 1 to 6] for detention in the living body by which said tubed covering consists of an inside side film and an external surface side film by which a laminating is carried out to this inside side film, and said marker and said stent body are arranged between said inside side film and said external surface side film.
[Claim 9] The stent body of the part by said tubed covering covered is stent [according to claim 1 to 6] for detention in the living body which is in the condition of having laid underground in this tubed covering.
[Claim 10] Said stent body is stent [according to claim 1 to 9] for detention in the living body by which the whole side face of this stent body is covered with tubed covering.
[Claim 11] Said stent body is stent [according to claim 10] for detention in the living body which has the part which is not covered with tubed covering by these some stent bodies.
[Claim 12] It is the stent [according to claim 1 to 9] for detention in the living body by which, as for said stent body, the side face of the central part of this stent body is covered with tubed covering, and, as for this stent body, both ends are not covered with this tubed covering.
[Claim 13] Said stent body is stent [according to claim 1 to 12] for detention in the living body currently fabricated in the shape of a spiral with said frame structure object of JIGUZAKU structure.
[Claim 14] Said stent body is stent [according to claim 1 to 12] for detention in the living body

in which it is formed in in the shape of a cylindrical shape, and two or more openings which open the external surface and inside of the shape of this cylindrical shape for free passage are formed.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the stent for detention in the living body used for the improvement of the narrow segment produced in the living body, such as an organ of a blood vessel, a bile duct, a trachea, an esophagus, an urethra, and others.
[0002]
[Description of the Prior Art] Conventionally, it inserts in the narrow segment of living body lumina, such as an organ of a blood vessel, a bile duct, an esophagus, a trachea, an urethra, and others, or a coelome, and the various stent for securing a lumen or coelome space is proposed. The stent has the covered stent which prepared flexibility covering, in order to prevent the restenosis which invades from between the stanchions of the metal of the metallic stent only by the metal, and the metallic stent according to structure. As covered stent, there are some which are indicated by JP,2-174859,A and JP,4-263852,A, for example. And insertion into the coelome of the stent and detention are mainly performed under an X-ray fluoroscope, checking physical relationship in a narrow segment. For this reason, insertion into the coelome of the stent and detention actuation become easy by giving the marker which can be checked by looking by X-ray imaging to a part of stent. Some which are indicated by JP,2825452,B, a JP,8-206225,A official report, the Patent Publication Heisei No. 505319 [seven to] official report, and JP,274655,B are one of those raised imaging nature by fixing a marker to a stent body.
[0003]
[Problem(s) to be Solved by the Invention] In the above-mentioned stent, since the marker is fixed to the stent body which is a metal, there is a fault that the stent metal stanchion in the marker installation section ******s thickly, the stent delivery equipment at the time of inserting also becomes thick, and the operability at the time of insertion and a patient's burden become large. Moreover, there are some which twist the fiber of the thing which is the covered stent and knits a non-penetrated metal fiber on the textiles of covering material, or imaging nature (the Patent Publication Heisei No. 509899 [eight to] official report, JP,8-56968,A). However, if textiles are not knit and loaded with this, it is difficult, and imaging nature fiber is limited to a yarn-like thing, and cannot give sufficient X-ray imaging nature, but has the trouble of also producing hypertrophy of the stent further in the part to which a knit lump laps with a stent body. Then, the purpose of this invention offers the covered type stent for detention in the living body which has sufficient X-ray imaging nature, without canceling the trouble of the above-mentioned conventional technique and hypertrophying the stanchion section of a stent body.
[0004]
[Means for Solving the Problem] It is the stent for detention in the living body which what attains the above-mentioned purpose is formed in the shape of a cylindrical shape, and has opening on a side face, and this stent is stent [equipped with a stent body, tubed covering which covers the side face of this stent body, and the marker for X-ray imaging prepared in this tubed covering so that said stent body might not be contacted] for detention in the living body.
[0005] And as for said marker, being prepared in the edge of said tubed covering is desirable. Moreover, said marker may be prepared in the both ends of said tubed covering, respectively.

Furthermore, as for said stent for detention in the living body, it is desirable that it is what is compressed at the time of living body interpolation close, reduces the diameter of, and is restored to the configuration before contraction at the time of detention in the living body. Moreover, as for said marker, it is desirable that it is the tabular object, spherical object, or pillar-shaped object formed with the X-ray imaging nature metal. And as for said marker, it is desirable that the encapsulation is carried out with said tubed covering.

[0006] Moreover, said tubed covering consists of an inside side film and an external surface side film by which a laminating is carried out to this inside side film, and, as for said marker, it is desirable to be arranged between said inside side film and said external surface side film. Furthermore, said tubed covering consists of an inside side film and an external surface side film by which a laminating is carried out to this inside side film, and, as for said marker and said stent body, it is desirable to be arranged between said inside side film and said external surface side film.

[0007] And as for the stent body of the part by said tubed covering covered, it is desirable that it is in the condition of having laid underground in this tubed covering. Moreover, as for said stent body, it is desirable that the whole side face of this stent body is covered with tubed covering. Moreover, said stent body may have the part which is not covered with tubed covering by these some stent bodies. Furthermore, as for said stent body, the side face of the central part of this stent body is covered with tubed covering, and, as for this stent body, both ends may not be covered with this tubed covering. And as for said stent body, it is desirable to be fabricated in the shape of a spiral with said frame structure object of JIGUZAKU structure. Moreover, said stent body may be formed in the shape of a cylindrical shape, and two or more openings which open the external surface and inside of the shape of this cylindrical shape for free passage may be formed.

[0008]

[Embodiment of the Invention] The stent of this invention is explained using the example shown in the drawing. Drawing 1 is the perspective view of one example of the stent for detention of this invention in the living body, and drawing 2 is the development view of the stent body of the stent shown in drawing 1 . The stent 1 for detention of this example in the living body is stent for detention in the living body formed in the shape of a cylindrical shape with the frame structure object 4, as shown in drawing 1 . The stent 1 is equipped with the marker 5 for X-ray imaging prepared in the stent body 2, the tubed covering 3 which covers the side face of the stent body 2, and the tubed covering 3 so that the stent body 2 might not be contacted.

[0009] As shown in drawing 1 , the encapsulation (blockade) of the side attachment wall (a peripheral face, inner skin or a peripheral face, and inner skin) of the stent body 2 is carried out with the tubed covering 3. For this reason, it prevents that a body tissue invades in the stent 1 from the exterior of the stent 1. Although the stent 1 of this example is variously considered by the path of the coelome to detain, it is a tube-like object, and 2.0-30mm, an outer diameter is 2.5mm - 20mm, a bore is a 1.6-19.1mm thing preferably 1.0-29mm, and die length is 10-110mm preferably 5-200mm. In addition, in this example, as stent 1, it is compressed at the time of living body interpolation close, the diameter is reduced, and it explains using the example applied to the so-called self expander bull stent which a stress load is canceled at the time of detention in the living body, and is restored to the configuration before contraction. In addition, the stent 1 of this invention may be the so-called balun expander bull stent which does not carry out self-extending.

[0010] The stent body 2 used for the stent 1 of this example is fabricated in the shape of a spiral with the frame structure object 4 of the JIGUZAKU structure of having opening on the side face of a cylindrical pipe configuration. Thus, by being zigzag structure, the diameter can be expanded at the time of restoration and the curved narrow segment can also curve along with it by being a spiral-like. in addition, what the configuration of the stent body 2 is not limited in the shape of a spiral, and has many notches of a square shape and knitted fabric -- textile -- what was made into the ** may be used.

[0011] The stent body 2 of this example has zigzag structure by considering as the shape of a typeface of continuous "**", as shown in drawing 2 which developed the stent body 2 in the

stent 1 of drawing 1 . Furthermore, by forming the shape of a typeface of said ** by short line part 12a (about 5mm) and long line part 12b (about 8mm) from which die length differs, it is formed so that the frame structure object 12 may serve as a spiral configuration as a whole. However, the die length of this short line part 12a is changed timely by the therapy part detained. The spiral configuration of the stent body 2 of this example is formed with two frame structure objects arranged in juxtaposition, as shown in drawing 2 . Thus, by forming a spiral configuration with two frame structure objects, as shown in drawing 3 , it can be made smaller than the include angle beta as shown in drawing 4 R> 4, when the include angle alpha which the shaft orientations of the stent 1 and the direction of a spiral of a frame structure object make forms a spiral configuration with one frame structure object, and the stent 1 can be made more flexible. The frame structure object arranged in juxtaposition may not be limited to two, and may be about 3-4.

[0012] Two frame structure objects 4a and 4b which form the stent body 2 of this example are in the condition of having connected in the central connection section 11 and the end connection section 13, respectively. In addition, what is necessary is just to have connected two frame structure objects 4a and 4b by at least two places. For example, it is desirable that the end of the frame structure objects 4a and 4b has connected respectively in one. Thereby, since the free end is not formed, it can prevent that an end does damage to the wall of a coelome (blood vessel). In this example, as shown in drawing 2 , the end has connected in the connection section 13. Furthermore, as shown in drawing 2 , as for the central connection section 11, it is desirable to connect both the flections of the frame structure objects 4a and 4b. Thus, by connecting both flections, the connection section will be in a decussation condition and can heighten extended holding power more. However, the central connection section 11 could be formed but you may connect only at both ends.

[0013] Synthetic resin or a metal is used as an ingredient of the stent body 2. A thing with a degree of hardness and elasticity is used to some extent, and biocompatibility resin of synthetic resin is desirable. Specifically, there are polyolefine, polyester, a fluororesin, etc. As polyolefine, polyethylene and polypropylene are mentioned, for example and PTFE, ETFE, etc. are mentioned, for example as polyethylene terephthalate, polybutylene terephthalate, and a fluororesin as polyester. Moreover, as a metal, stainless steel, tantalum titanium, a nickel titanium alloy, and an elastic metal can be used. Especially, an elastic metal is desirable. As an elastic metal, a superelastic alloy is desirable. Generally a superelastic alloy is called shape memory alloy, and shows elasticity at living body temperature (near 37 degree C) at least. It is the Ti Ni alloy of 49 - 53 atom %nickel especially preferably. Moreover, it is changeable timely by choosing the conditions of cooling working ratio or/and the last heat treatment considering as the Ti-nickel-X alloys (X=Co, Fe, Mn, Cr, V, aluminum, Nb, W, B, etc.) which permuted some alloys of Ti-nickel at 0.01 - 10.0%, or by considering as the Ti-nickel-X alloy (X=Cu, Pb, Zr) which permuted some Ti-nickel-X alloys by 0.01 - 30.0% of atom. A mechanical property is changeable timely by furthermore choosing the rate of cold working, and/or a final treatment using a Ti-nickel-X alloy.

[0014] Shaping of the stent body 2 can be performed by removing the part which serves as the free passage section from laser beam machining (for example, YAG laser), an electron discharge method, chemical etching, cutting, etc. for example, in an elastic metallic pipe. and the buckling strength (yield stress at the time of a load) of the superelastic alloy used -- 5-20kg/mm2 (22 degrees C) -- more -- desirable -- 8-150kg/mm2 and restoration stress (yield stress at the time of unloading) -- 3-180kg/mm2 (22 degrees C) -- 5-130kg /is [mm] 2 more preferably. Even if it makes superelastic [here] deform to the field which the usual metal deforms plastically in service temperature (bending, tension, compression), it means recovering in the original configuration mostly, without needing heating after release of deformation.

[0015] Furthermore, as for the stent body 2, being formed in one is desirable by processing a superelastic metallic pipe. Specifically, the stent body 2 of this example is producible by removing except the part used as the frame structure object 4 (stent body 2) from a superelastic metallic pipe. This really in which the changed part of physical properties rapid as a whole of the stent body 2 is not formed becomes a formation object. When there is a rapid

changed part of physical properties, the deformation moving state in which the part differed from other parts is shown. And there is a danger of metal stress starting the part from which physical properties differed, and damaging from the part. Moreover, if the changed part of physical properties exists, as stent, it becomes unnatural, and deformation will form flow unnatural in the style of [which flows the interior] blood, and will cause restenosis.

[0016] In addition, the superelastic metallic pipe used for formation of the stent 1 can be narrow-diameter-ized to predetermined thickness and the pipe of an outer diameter by hot pressing and extrusion by forming a large diameter pipe and repeating a dice drawing process and a heat treatment process successively after that by dissolving in inert gas or a vacuum ambient atmosphere, forming the ingot of superelastic alloys, such as a Ti Ni alloy, and grinding this ingot mechanically, and, finally can manufacture a front face chemical or by carrying out physical polish. Laser beam machining (for example, YAG laser), an electron discharge method, chemical etching, cutting, etc. can perform processing of a superelastic metallic pipe, and those concomitant use may perform further. Thus, when the time (at the time [At the time / If it puts in another way / of detention] of stress unloading) (condition whose diameter was reduced) of the escape of the stent and un-detaining [of the stent] is compared, the stent 1 produced by processing a superelastic metallic pipe is extent prolonged a little in the shaft orientations of the stent at the time of un-detaining [of the stent], and there are few differences of the configuration between both and differences of a dimension. For this reason, there is little deformation at the time of configuration restoration in the living body, that is, there is almost no motion of the edge of the stent in the living body [at the time of configuration restoration]. Therefore, it is rare to do damage to a living body wall at the time of configuration restoration. Furthermore, as for the external surface of the stent, it is desirable to consider as the condition of there being no edge and having beveled in the whole. Thereby, a stent body can prevent more certainly doing damage to a living body wall and covering 3.

[0017] In the stent 1 of this example, it has the covering section 7 whose stent body 2 is the part covered with covering 3, and the non-covering section 8 which the stent body 2 exposes. That is, the side face of the central part of the stent body 2 is covered with the tubed covering 3, and, as for the stent 1 of this example, the both ends of the stent body 2 are not covered with the tubed covering 3. In the stent 1 of this example, in the covering section 7, the free passage section (side attachment wall) of the stent body 2 is blocked, and prevents invasion of a body tissue from the exterior. Moreover, the non-covering section 8 serves to make not easily temporary [to a living body lumen] in the stent 1, and it contributes to initial immobilization of the stent 1, and is fixed by an encapsulation being carried out to a body tissue in 2nd order. In addition, when it does not expect firm immobilization to living body lumina, such as stent to remove after detention, like the stent 10 shown in drawing 6 , there is no non-covering section 8 and the encapsulation of the whole stent body 2 may be carried out with covering 3. Moreover, it can change by the lesion section and, only for one end, the non-covering section is [arrangement of covering]. Moreover, it has the covering section to both ends, and the non-covering section may be arranged in the center section.

[0018] Moreover, in the stent 1 of this invention, since it has a marker 5, the location of the stent 1 can be checked by X-ray imaging. Especially, in this example, since the end section of the covering section 7 is equipped with a marker 5, the location of the end section of the covering section 7 can be checked by X-ray imaging. The marker 5 is formed in at least one edge of covering 3. For this reason, the location of one [at least] edge of the covering section 7 can be checked by X-ray imaging. Preferably, a marker 5 is prepared in every at least one both ends of covering 3. If it does in this way, the location of the both ends of covering 3 can be checked by X-ray imaging. Furthermore, a marker 5 is that two or more are prepared in the both ends of covering 3, respectively preferably. If it does in this way, the certain check of the location of the both ends of the covering section 7 can be carried out by X-ray imaging. Furthermore, if it puts in another way so that it may not become the location where two markers 5 prepared in the same edge face each other as shown in drawing 1 and drawing 6 in forming two or more markers 5 in the both ends of covering 3, respectively, it is desirable that the interior angle of the polygonal line which connects the medial axis of the stent 1 to two markers 5 arranges so that it

may not become 180 degrees. It is desirable that the interior angle of the polygonal line which connects the medial axis of the stent 1 to two markers 5 arranges preferably so that it may become the range of 30 degrees - 150 degrees, and it is desirable to arrange especially, so that it may become the range which is 60 degrees - 120 degrees. By doing in this way, it can prevent that two markers 5 overlap at the time of X-ray imaging. Furthermore, as shown in drawing 1 , it is desirable that two markers 5 prepared in both ends arrange so that it may not overlap altogether, when it sees from the shaft orientations of the stent 1. In the stent 1 of the example of drawing 1 , although it serves as a location which overlap mostly when [at which the marker 5 was seen from the shaft orientations of the stent] prepared in both ends, other markers 5 serve as one [at a time] arrangement not overlapping. If it does in this way, even if magnitude changes with the directions seen under X-ray imaging like the marker of a plate, by shifting as mentioned above, no markers look small to coincidence under X-ray imaging, and localization, such as an edge of the stent, can be performed certainly.

[0019] Moreover, the diameter of the stent is reduced at the time of insertion, it is used for the application made to extend after detention, and can also check change in the condition of having extended from the condition that the diameter was reduced for a marker from the physical relationship of a marker by making it plurality in that case. Moreover, a marker may be given to the center section of the stent covering section. Thereby, the center of the stent can be checked and a more detailed situation can be checked with an X-ray by attaching to covering in an equal allocation length location.

[0020] The tubed covering 3 in the stent 1 consists of an inside side film 14 prepared in the inside of the stent body 2 as shown in drawing 5 , and an external surface side film 15 prepared in the external surface side of the stent body 2, and the inside flank film 14 and the external surface side film 15 serve as a tube-like object. In the stent 1 of this example, the tubed covering 3 is equipped with the inside film 14 and the outside film 15 which wrap the X-ray marker 5 entirely jointly while it covers the stent body 2 including the side attachment wall which carries out opening. Furthermore, the tubed covering 3 is equipped with the glue line 16 which exists between a film and the stent body 2 and between a film and the X-ray marker 5 between films 14 and 15. Furthermore, as shown in drawing 5 , while pinching the stent body 2 and a marker 5 by between the inside side film 14 and the external surface side film 15, the films 14 and 15 of two sheets have fixed by jointing 16.

[0021] And the X-ray imaging marker 5 is arranged so that the stent body 2 may not be contacted between the inside side film 14 and the external surface side film 15. Since the tubed covering 3 is formed so that the stent body 2 and a marker 5 may be inserted, it does not have balking from the stent body 2 of the tubed covering 3, and prevents separation with the stent body 2 after the time of the detention activity of the stent 1, and detention, and covering 3. Moreover, since the marker 5 is also put with the tubed covering 3 and in other words it is in the condition of having been embedded in covering 3, a marker 5 does not break away from the tubed covering 3. Thus, since the tubed covering 3 is formed so that the stent body 2 may be pinched, its deformation flattery nature of covering 3 to deformation of the stent body 2 is high, and it is rare for covering 3 to serve as a failure of deformation of the stent body 2. Furthermore, since the fixing parts of the inside film 14 and the outside film 15 are distributing to the whole stent 1, this thing cannot be found to a part strongly [stress] at the time of use and detention, and there is also little danger of fracture of the covering 3 in a fixing part.

[0022] That in which it is used, and it has plasticity or elasticity and that in which films 14 and 15 have a glue line 16 and an adhesive property has a certain amount of reinforcement is used. For example, a fluororesin film, a polyolefine film, polyester, thermoplastic polyurethane, etc. can be used. As a fluororesin film, PTFE, ETFE, etc. can be used, as a polyolefine film, polyethylene, polypropylene, etc. can be used and polyethylene terephthalate, polybutylene terephthalate, etc. can be used as polyester, for example. An about 0.01-0.2mm thing is [that what is necessary is just a thing 1mm or less] suitable for the thickness of a film more preferably.

[0023] Furthermore, it is suitable for films 14 and 15 that it is the porous membrane formed with the above synthetic resin. Since glue line formation resin flows in the pore in a film by using porous membrane, a glue line 16 and fixing reinforcement can become high, and a film 14 and a

film 15 can prevent the exfoliation at the time of use, and can grasp a marker 5 and the stent body 2 firmly further. As a porosity film, that whose void content is about 25 - 80% is suitable. Moreover, an about 0.1-10-micrometer thing is suitable for a narrow diameter hole. If it is the range of the above-mentioned void content, there is also little invasion in the living body, and it is satisfactory also to the physical properties of covering 3. As a porosity film, what was formed by the extending method, the solid-liquid-separation method, the beam irradiating method, etc. can be used. What was preferably formed by the strong high extending method, especially the strong biaxial extending method is suitable. As an example of a porosity film, there are trade name pore chlorofluocarbon (Sumitomo Electric Industries, Inc. make) of a PTFE system, trade name micro tex (NITTO DENKO CORP. make), trade name GOATEKKUSU (product made from Gore-tex SUJAPAN), etc., for example.

[0024] As a glue line 16, as long as it has an adhesive property on films 14 and 15, what kind of thing may be used. Moreover, when films 14 and 15 have plasticity and elasticity, that in which the glue line also has elasticity and plasticity is desirable. It is possible to use, if it is resin meltable to the solvent which has a glue line as an example of a glue line 16, and it is the quality of the material which can stop the gestalt of a film even if a film is dissolved to some extent in a solvent with films 14 and 15 by the solvent into the insoluble quality of the material or adhesion time amount (inside of the time amount which has transpired the solvent from the glue line). Under the present circumstances, as for the glue line which will be dissolved if films 14 and 15 are porosity, invading into pore is desirable. Specifically as a glue line, meltable fluororesin etc. is in THF (tetra-hydroxy furan) at meltable polyurethane and DMF (dimethyl formaldehyde). Temporary immobilization of the stent body 2 and the X-ray marker 5 can be carried out, a glue line solvent can be applied to the periphery of a film 14, a film 15 can be arranged on the periphery, and it can paste up by transpiring a solvent.

[0025] Moreover, as covering, a glue line 16 may be formed with thermoplastics and what has the melting point higher than glue line formation resin may be used for films 14 and 15. As thermoplastics which forms a glue line 16, a thermoplastic fluororesin, polyolefine (for example, low density polyethylene, low consistency polypropylene), vinyl chloride resin, an ethylene-vinyl acetate copolymer, a polyester (low consistency polyester) polycarbonate, ABS, silicone rubber (RTV rubber), thermoplastic polyurethane, etc. can be used. That whose melting point is about 120-200 degrees C as thermoplastics is suitable. What has the melting point higher than the glue line formation resin which is a fluororesin film, a polyolefine film, polyester, thermoplastic polyurethane, etc., and is used as a film can be used. As a fluororesin film, PTFE, ETFE, etc. can be used, as a polyolefine film, polyethylene, polypropylene, etc. can be used and polyethylene terephthalate, polybutylene terephthalate, etc. can be used as polyester, for example. Formation of covering in this case can coat the periphery of a film 14 with a glue line, among those can carry out temporary immobilization of the stent body 2 and the X-ray marker 5 on the outside of a film, can roll a film 15 further, and can be performed by carrying out heating immobilization again. The stent body 2 and the X-ray marker 5 may be beforehand coated with a glue line in that case. Temporary immobilization may be based on partial heating and an instantaneous adhesive.

[0026] The X-ray marker 5 is formed with the X-ray imaging nature ingredient (radiopacity ingredient). Thereby, the location of covering 3 can be grasped under X-ray imaging. As a radiopacity ingredient, X-ray imaging nature metals, such as gold, platinum, a platinum iridium alloy, platinum, silver, stainless steel, or those alloys, are suitable, for example. Furthermore, a marker 5 may be the resin molding containing X-ray imaging matter powder. As X-ray imaging matter powder, a barium sulfate, self-extinguishing, tungsten powder, the further above-mentioned metal powder, etc. can be used.

[0027] The shape of tabular, a globular shape, and a column etc. has as the configuration of a marker 5. Preferably, it is tabular and, specifically, it is desirable especially monotonous tabular [, such as the shape of discoid and the ellipse board and polygon tabular,] and that it is sheet metal-like. Moreover, a marker is good also as that to which surface roughening of the external surface was carried out. By doing in this way, adhesion of a marker 5 with the coat formed for the glue line with which covering 3 is equipped, or covering 3 improves. In addition, it is desirable

not to do damage to covering 3, and it is desirable that it is the configuration which wore the radius of circle without an edge. When disc-like, the diameter of magnitude is 0.7-2mm preferably 0.4-3mm, and thickness is 0.5-0.2mm preferably 0.03-0.3mm. Moreover, the thing which put slitting into what was formed in tabular suitably, the thing which whirled and coiled the imaging nature metal wire tabular may be used. Furthermore, the textile fabrics (the shape of for example, a mesh) of an imaging nature metal thin line, knitting, etc. may be used.

[0028] Furthermore, as an X-ray imaging marker 5, as shown in drawing 2 R> 2, the thing used as the configuration where the cutting plane of the direction which intersects perpendicularly with the shaft orientations of the stent 1 curved in the shape of radii is desirable. Containing smaller is possible, in case the stent is arranged with a delivery catheter etc. when a marker is large, and the diameter is made to reduce. By doing in this way, a marker 5 can make few things stress given to covering 3. Moreover, it may follow and deform into the configuration of covering 3 as mentioned above at the time of stent formation by using a certain amount of flexible thing as a marker 5. When the stent 1 is detained in a living body lumen by [these] making it like, the fall of the adhesion of the external surface of covering 3 and living body lumen internal surface resulting from a marker 5 can be made into few things.

[0029] Furthermore, as shown in drawing 1 , when the stent body 2 is equipped with the non-covering section 8, in the front face which the stent body 2 exposes at least, it is desirable that a biocompatibility metal or biocompatibility resin is covered. As a biocompatible mater, the synthetic resin or the metal which has a biocompatible mater can be considered. As synthetic resin, although it can choose from the resin of a thermoplastic system or a heat-curing system, polyolefines (for example, polyethylene, polypropylene, ethylene propylene rubber, etc.), a polyvinyl chloride, an ethylene-vinylacetate copolymer, a polyamide elastomer, polyurethane, polyester, a fluororesin, silicone rubber, etc. can be used, and they are polyolefine, a polyamide elastomer, polyester or polyurethane, and biodegradation nature resin (for example, polylactic acid, polyglycolic acid, both copolymer) preferably, for example. As for a synthetic-resin coat, it is desirable that it is flexible to extent which does not become the hindrance of a curve of the frame structure object 4 which constitutes the stent body 2. 5-300 micrometers of thickness of a synthetic-resin coat are 10-200 micrometers preferably.

[0030] As an approach of covering synthetic resin thinly on the front face of the stent body 2, there is chemical vacuum deposition covered while carrying out the polymerization of the approach and monomer which insert and cover the stent body 2 in the synthetic resin of a melting condition or a solution condition on the front face of the stent body 2, for example. When ultra-thin resin covering is required, covering which used the dilute solution, or chemical vacuum deposition is suitable.

[0031] Furthermore, in order to raise a biocompatible mater more, an anti-thrombogenic material may be covered or fixed to the above-mentioned resin coat. independent [in various kinds of well-known resin] as an anti-thrombogenic material -- or although it can be mixed and used, the copolymer (for example, HEMA-St-HEMA block copolymer) of polyhydroxyethyl methacrylate, hydroxyethyl methacrylate, and styrene etc. can use it suitably, for example. As a biocompatibility metal, gold, silver, platinum, and titanium are mentioned, for example. The silicon carbide using the gold plate using the electroplating method as an approach of covering the front face of the stent body 2 with a metal, stainless steel plating using vacuum deposition, and a spatter, titanium nitride plating, gold plate, etc. can be considered.

[0032] Moreover, production of the stent, especially formation of covering 3 are not limited when using what serves as a film object beforehand. For example, covering 3 may be formed using the resin solution which has coat formation. The filmy material (if it puts in another way basic layer) which blocks the side attachment wall of the stent is formed by specifically preparing the liquefied object which dissolved the polyurethane elastomer, the fluororesin elastomer, etc. in the proper solvent, being immersed, pulling up the stent body 2 in this liquefied object, and volatilizing a solvent. In addition, immersion of the stent body 2 to the above-mentioned liquefied object, raising, and the volatilization activity of a solvent may be done repeatedly. And after putting a marker 5 on the external surface of the filmy material (if it puts in another way basic layer) formed by doing in this way and carrying out temporary immobilization as occasion demands,

covering 3 can be formed by being immersed, pulling up the stent body 2 in the above-mentioned liquefied object, and volatilizing a solvent again. In addition, although a thing the same as that of what was used first as a liquefied object immersed after marker temporary immobilization, or of the same kind is suitable, it is not limited to this. As long as there is an adhesive property with the formed filmy material (basic layer), what kind of thing may be used. Moreover, although what equips both resin with an adhesive property is [that an adhesive property should just be what does not exfoliate when it changes into the condition of covering 3] suitable, you may paste up with a solvent. Thus, the formed covering 3 serves as cross-section structure as shown in drawing 7 . In this case, covering 3 consists of an outer layer 24 which wraps entirely the marker 5, the inner layer 23, and marker which have been arranged on the external surface of the inner layer 23 which wraps the stent body 2 entirely, and a inner layer. As an example of a liquefied object, the THF (tetra-hydroxy furan) solution of a polyurethane elastomer, the DMF (dimethyl formaldehyde) solution of a fluororesin elastomer, etc. can be used. Moreover, temporary immobilization of a marker 5 is possible also for applying partial heating adhesion and a solvent to a marker 5, and drying, and may use adhesives, such as cyanoacrylate, for others.

[0033] Moreover, the configuration of the stent body 2 is not limited to what was mentioned above. For example, the thing of a configuration as shown in drawing 8 and drawing 1010 may be used. Drawing 8 is the perspective view of other examples of the stent of this invention, and drawing 9 is an expanded sectional view near [which was shown in drawing 8] the X-ray imaging marker arrangement part of the stent. Drawing 10 is the perspective view of other examples of the stent of this invention, and drawing 11 is an expanded sectional view near [which was shown in drawing 10] the X-ray imaging marker arrangement part of the stent. The stent 20 of this example is equipped with the tubed covering 3 which blocks the side face of the stent body 21 which was formed in the shape of a cylindrical shape like the stent 1, and whose diameter can be reduced, and the stent body 21. The difference with the stent 20 of this example and the stent 1 mentioned above is only the configuration of a stent body. About the tubed covering 3 and a marker 5, it is the same as what was mentioned above.

[0034] As the stent body 21 is shown in drawing 8 , it has two or more notch or two or more openings which were formed in the side face of a cylinder object, and the deformation miscellaneous function which assists the deformation to the direction whose diameter an outer diameter reduces by this at the time of a stress load may be formed. The stent body 21 is specifically a cylindrical frame without front fork, and has 22d of notches divided by opening (or hole) 22c and frame 22a which were divided by Frames 22a and 22b (****). The edge of the stent body 21 is on one circle, it is constituted by the aggregate of two or more not continuous radii, and they are carrying out equiangular alienation mostly. If 22d of notches is not formed, the edge of the stent body 21 is a perfect circle form mostly, and forms two or more radii which carried out equiangular alienation from the core of the stent body 21 by forming 22d of notches. Frame 22a is formed so that it may be extended aslant [predetermined include-angle] to the medial axis of the stent body 21. Moreover, two frame 22a which continues at the end forms equilateral [of an isosceles triangle / two]. And frame 22a of both ends is connected by frame 22b. Frame 22b is formed almost in parallel with the medial axis of a frame without front fork 20. In this example, frame 22b has one twice [about] the width of face of frame 22a. Moreover, as shown in drawing 9 , as for the cross-section configuration when cutting in the direction which intersects perpendicularly with the medial axis of the stent body 21 of Frames 22a and 22b, the surface serves as [the side side] a flabellate form used as a straight line with radii with a base shorter than the surface with radii. Furthermore, the external surface of a frame (stent body 21) is in the condition of there being no edge and having beveled in the whole.

[0035] By this stent body 21, since it has a notch at the edge, deformation of the edge of the stent becomes easy, especially, the partial metamorphosis of an edge becomes possible and the response to the time of deformation of the blood vessel detained becomes good. Moreover, since the edge of the stent body 21 is formed of the edge of two or more frame 22a, it cannot collapse easily and has sufficient reinforcement. Moreover, among both ends, opening 22c surrounded by Frames 22a and 22b is formed, and this opening 22c deforms easily according to deformation of frame 22a. For this reason, the deformation in that center section (center section of the frame

without front fork 20) is easy for the stent body 21.
[0036] In addition, in this example, opening 22c is carrying out the hexagon of the configuration pressed and crushed, and 22d of notches is carrying out the isosceles triangle. 22d of two or more six notches is specifically formed in each edge, and each serves as an almost equal configuration. Moreover, as opening 22c also forms the side face of the stent body 21, specifically, two or more six pieces are formed. In addition, a notch and opening are not limited to an above-mentioned configuration and the above-mentioned number, and about 3-10 pieces are suitable for them as 3-10 pieces and opening as a notch. By the stent body 21, the stent member of the above configurations serves as a configuration connected two by articulated section 2e. What was explained in the stent body 2 as a formation ingredient of the stent body 21 can use it suitably.
[0037] And it is produced by removing the part used as a notch and opening like the stent body 2 which also mentioned the stent body 21 above using a superelastic metallic pipe (for example, cutting, the dissolution). According to this approach, it really in which the changed part of rapid physical properties is not formed becomes a formation object. And for example, laser beam machining (for example, YAG laser), an electron discharge method, chemical etching, cutting, etc. can perform formation of the notch to a superelastic metallic pipe, or two or more openings. In addition, the configuration of the stent body of the type [reduce / at the time of insertion / the diameter / and] whose diameter can be expanded at the time of emission in the living body (restoration) may not be limited to two kinds of things which were mentioned above, and the thing of the shape of a coiled form thing, a cylinder-like thing, a roll-like thing, a shape tube-like thing, a supercoil-like thing, the thing of a flat-spring coiled form, a basket, or a mesh is sufficient as it.
[0038] Also in the stent 20 of this example, the covering section 7 which is the part by which the stent body 21 was covered with covering 3, and the non-covering section 8 which the stent body 21 exposes are formed. In addition, there is no non-covering section 8 like the stent 30 shown in drawing 10 , and the encapsulation of the whole stent body 21 may be carried out with covering 3. Moreover, also in the stent 20 and 30 of these examples, since it has a marker 5, the location of the end section of the covering section of the stent can be checked by X-ray imaging. The marker 5 is formed in at least one edge of covering 3. For this reason, the location of one [at least] edge of the covering section can be checked by X-ray imaging. Preferably, a marker 5 is prepared in every at least one both ends of covering 3. If it does in this way, the location of the both ends of the covering section can be checked by X-ray imaging. Furthermore, a marker 5 is that two or more are prepared in the both ends of covering 3, respectively preferably. If it does in this way, the location of the both ends of the covering section can be certainly checked by X-ray imaging.
[0039] Furthermore, if it puts in another way so that it may not become the location where two markers 5 prepared in the same edge face each other as shown in drawing 8 and drawing 10 in forming two or more markers 5 in the both ends of covering 3, respectively, it is desirable that the interior angle of the polygonal line which connects the medial axis of the stent to two markers 5 arranges so that it may not become 180 degrees. It is desirable that the interior angle of the polygonal line which connects the medial axis of the stent to two markers 5 arranges preferably so that it may become the range of 30 degrees - 150 degrees, and it is desirable to arrange especially, so that it may become the range which is 60 degrees - 120 degrees. By doing in this way, it can prevent that two markers 5 overlap at the time of X-ray imaging. Furthermore, as shown in drawing 8 and drawing 10 R> 0, it is desirable that two markers 5 prepared in both ends arrange so that it may not overlap altogether, when it sees from the shaft orientations of the stent. In the stent of the example of drawing 8 and drawing 10 , although it serves as a location which overlap mostly when [at which the marker 5 was seen from the shaft orientations of tentorium] prepared in both ends, other markers 5 serve as one [at a time] arrangement not overlapping. If it does in this way, localization, such as an edge, will be made also with the marker which changes the visible magnitude in an X-ray according to the direction seen like the big marker of a plate, without depending in the direction of the roentgenography of the stent.
[0040] Moreover, the diameter of the stent is reduced at the time of insertion, it is used for the

application made to extend after detention, and can also check change in the condition of having extended from the condition that the diameter was reduced for a marker from the physical relationship of a marker by making it plurality in that case. Moreover, the core of the stent can be checked by giving a marker to a stent covering center section, and a more detailed situation can be checked with an X-ray by attaching to covering in an equal allocation length location.
[0041] Moreover, it is the same as the covering 3 in the stent 1 mentioned above while the covering 3 of the stent 20 of the example shown in drawing 8 was shown in drawing 1 and drawing 5 , and the stent 20 including covering 3 had the cross-section configuration as shown in drawing 9 , and covering 3 is equipped with the glue line 16 arranged between the inside film 14, the outside film 15, and both. Moreover, it is the same as the covering 3 in the stent 20 mentioned above while covering of the stent of the example shown in drawing 10 was shown in drawing 6 and drawing 7 , and the stent 30 including covering 3 has a cross-section configuration as shown in drawing 11 , and covering 3 consists of an outer layer 24 which wraps entirely the marker 5, the inner layer 23, and marker which have been arranged on the external surface of the inner layer 23 which wraps a stent body entirely, and a inner layer. In addition, covering is good also as a thing equipped with the glue line 16 arranged between the inside film 14, the outside film 15, and both like [while the whole stent body is shown in drawing 1 and drawing 5 also in the stent of the type which covering wraps entirely like the example shown in drawing 6 and drawing 10] the stent 1 mentioned above.
[0042] The manufacture approach of the stent of this invention, especially the covering formation approach are explained. When making covering 3 into the thing of multilayer structure, it can carry out by forming the 2nd layer (outer layer) in the outside of the 1st layer by covering the resin in which cast processing to the outside surface is possible (for example, dipping) after fixing the stent bodies 2 and 21 and a marker 5 to the external surface of the film of the 1st layer. In this case, before forming the 2nd layer, it is desirable to perform the stent bodies 2 and 21 and a marker 5, and to perform temporary immobilization on the film of the 1st layer. When the 1st stratification film consists of thermoplastics, heating sticking by pressure of a marker 5 can perform temporary immobilization. The same is said of a stent body. Also in this case, as a marker 5, although a metal thing is suitable, as long as it can be equal to heating near the melting point of the 1st stratification film, you may be the resin marker 5 containing X-ray imaging nature metal powder. Moreover, adhesives may perform temporary immobilization.
[0043] Moreover, formation of covering 3 is not limited when using what serves as a film object beforehand. For example, covering 3 may be formed using the resin solution which has coat formation. The filmy material which blocks the side attachment wall of the stent can be formed by specifically preparing the liquefied object which dissolved the polyurethane elastomer, the fluororesin elastomer, etc. in the proper solvent, being immersed, pulling up a stent body in this liquefied object, and volatilizing a solvent. In addition, immersion of the stent body to the above-mentioned liquefied object, raising, and the volatilization activity of a solvent may be done repeatedly. And after putting a marker 5 on the external surface of the filmy material formed by doing in this way and carrying out temporary immobilization as occasion demands, covering 3 can be formed by being immersed, pulling up a stent body in the above-mentioned liquefied object, and volatilizing a solvent again. In addition, as a liquefied object immersed after marker temporary immobilization, it may differ from what was used first as an ingredient that there should just be an adhesive property. Moreover, although what equips both resin with an adhesive property is [that what is necessary is just what does not exfoliate when it changes into the condition of covering 3] suitable for an adhesive property, it may be adhesion by the solvent.
[0044] As a liquefied object, the THF (tetra-hydroxy furan) solution of a polyurethane elastomer, the DMF (dimethyl formaldehyde) solution of a fluororesin elastomer, etc. can be used. Moreover, temporary immobilization of a marker 5 is possible also for applying partial heating adhesion and a solvent to a marker 5, and drying, and may use adhesives, such as cyanoacrylate, for others.
[0045] (Example 1) Cold working of the alloy pipe of a Ti Ni alloy (51 atom %nickel) was carried out, and the superelastic metallic pipe with the outer diameter of 9.9mm, the bore of 9.6mm, a thickness [of 0.15mm], and a die length of about 69mm was produced. Next, YAG laser SLby NEC Corp.116E (with an X-Y table) was used, the pipe was rotated, and laser processing of a

superelastic metallic pipe was performed. Processing conditions were processed on current 29A, processing speed 10 mm/min, and the Q switch frequency of 1kHz, and produced the stent body. And in order to bevel the edge of a stent body, the glass bead with a particle size of 15-30 micrometers was used, and blasting processing was carried out by the pressure of 2-3kg/cm2. This blasting processing performed trimming and beveling. Furthermore, the thermal denaturation part formed in the periphery of a stent body at the time of an electron discharge method was removed. This activity prepares the denaturation section processing liquid which mixed little hydrogen-peroxide liquid for the mixed liquor of fluoric acid and a nitric acid. The stent which carried out blasting processing as mentioned above is made immersed in this processing liquid (about 40 degrees C). The stent body of a configuration as carried out chemical etching of the external surface of the stent, and the frame structure object of a stent body served as a rectangle in which the cross-section configuration (cross section when cutting to the shaft orientations of a stent body) was able to take the angle mostly and shown in drawing 1 was produced.

[0046] The X-ray marker prepared four circular desk plates with a thickness [of 0.1mm], and a diameter of 1.2mm made from pure gold. Porosity film (trade name pore chlorofluocarbon, the Sumitomo Electric Industries, Inc. make, 0.05mm of thickness, and 30% of void contents) In the aperture of 0.5 micrometers, the melting point of 327 degrees C, and the quality of the material PTFE, fluororesin mold system elastomer solution [central glass company make, After applying SEFURARU software (trademark) and 7% with a melting point of 162-165 degrees C solution (solvent DMF)], it heated for 5 minutes, 140 degrees C of films were produced, and two things which cut this film in die length of 37mm and width of face of 50mm were produced. Temporary immobilization was twisted and carried out so that the porosity film of one sheet might be wound around a rod and a fluororesin mold system elastomer spreading side might become an external surface side.

[0047] After applying the above-mentioned fluororesin elastomer solution and being air-dry to a stent body and an X-ray marker, temporary immobilization of a stent body and the marker was carried out at the film by which temporary immobilization was carried out on the above-mentioned rod. And it twisted and temporary immobilization of the above-mentioned film was carried out on the outside so that a fluororesin system elastomer spreading side might become an inside side. And the rod heated at about 200 degrees C was pushed against the external surface of the stent formation object arranged as mentioned above, thermal melting arrival of the porosity film of two sheets was carried out, and formation and its fixing of tubed covering were performed. In addition, although the porosity film was carrying out opaque white for the existence of the usual pore, the rarefaction of it was carried out by pushing a heating rod. This is because the fluororesin elastomer which dissolved with heating invaded in pore.

[0048] Two pieces and a total of four pieces are made for two markers of each edge to become 90 arrangement centering on the shaft of the direction of a major axis mutually at the covering edge as for the location of the X-ray marker in this stent, and one of the markers of both ends has been arranged so that it may not lap at the shaft orientations of the stent. Thus, the stent of this invention of the gestalt shown in drawing 6 and drawing 7 was produced. The whole stent body is covered in the stent of this example by covering. This stent is applicable to a constriction improvement of an iliac artery, a femoral artery, and a bile duct.

[0049] (Example 2) The whole front face of the stent body produced like the example 1 was gold-plated. Gold plate warmed the sulfamic acid system plating bath (the TOKURIKI HONTEN CO., LTD. make, trade name ORO flex time TI) at about 40 degrees C, dissolved the cyanogen golden potassium, was immersed in the stent body during this plating bath, and performed electroplating. Thereby, the gold plate layer of 1.8-micrometer non-gloss was formed in the front face of a stent body. It produced using the porosity polypropylene film (the Toyobo filter paper incorporated company make, Grade TCP, the pole diameter of 3 micrometers, 30% of void contents, thickness of 30 micrometers, melting point of 130 degrees C) two films cut in die length of 37mm, and width of face of 50mm. It has arranged so that this film may be wound around a rod, the center of a stent body may turn into a center of a film and the both ends of a stent body may not become a film top, and the X-ray marker (it is the same as an example 1)

has been arranged so that a stent body may not be contacted at the edge of a film, and heating temporary immobilization of a stent body and the marker was carried out in the electric soldering iron. And although prepared in this way, 4% acetone solution of a fluororesin elastomer [central glass company make and SEFURARU software (trademark)] was applied to the external surface of a film existence part, the fluororesin elastomer coat was formed on the film which has arranged every 5 minutes, the stent body, and the marker in 60-degree C oven, tubed covering was produced, and the stent of this invention was manufactured. Two pieces and a total of four pieces were made for two markers of each edge to become 90-degree arrangement centering on the shaft of the direction of a major axis mutually at the covering edge as for the location of the X-ray marker in this stent. Thus, the stent of this invention of the configuration shown in drawing 1 and drawing 5 was produced. In the stent of this example, 10mm of both ends of a stent body was not covered each with covering, but the gold-plated stent body is exposed. This stent is applicable to the improvement of the constriction of an internal thoracic artery, an iliac artery, and a bile duct.

[0050] (Example 3) The stent body and the X-ray marker used the same thing as an example 1. 20% hydroxy [tetra-] furan solution of polyurethane [panDEKKUSU (trademark) and the Dainippon Ink & Chemicals, Inc. make] was prepared. The covering basic layer which repeats a stent body 10 times and becomes a stent body from polyurethane about the immersion and desiccation to a polyurethane solution in it was formed. It carried out right through inside the stent body in which the covering basic layer was formed, and temporary immobilization of the X-ray marker was carried out for the rod in ****** on the front face. About what carried out temporary immobilization of the marker, again, immersion to a polyurethane solution and desiccation were performed 10 times, tubed covering was formed, and the stent of this invention was manufactured. The location of the X-ray marker in this stent fixed two pieces and a total of four pieces to the covering edge so that two markers of each edge might become 90-degree arrangement centering on the shaft of the direction of a major axis mutually, and one of the markers of both ends has been arranged so that it may not lap with the shaft orientations of the stent. Thus, the stent of this invention was produced. The whole stent body is covered in the stent of this example by covering. This stent is applicable to a constriction improvement of an iliac artery, a femoral artery, and a bile duct.

[0051] (Example 4) Except having used what made the 70-micrometer gold streak about 2mm whorl discoid as an X-ray marker, it carried out like the example 1 and the stent of this invention was produced.

[0052] (Example 5) Except having used what wove the 10-micrometer gold streak in the shape of a mesh, carried out dipping about twice by the fluorinated elastomer circularly 3mm as an X-ray marker, and was made disc-like, it carried out like the example 2 and the stent of this invention was produced.

[0053] (Example 6) As an X-ray marker, after kneading [van DEKKUSU (trademark) and Dainippon Ink & Chemicals, Inc. make] made from polyurethane 20%, and 20% (new Nippon Kinzoku Co., Ltd. make) of tungsten powder, except having used what pierced this disc-like in the shape of a film, it carried out like the example 3 and the stent of this invention was produced.

[0054]

[Effect of the Invention] The stent for detention of this invention in the living body is stent for detention in the living body formed in the shape of a cylindrical shape with the frame structure object, and this stent is equipped with the marker for X-ray imaging prepared in the edge of a stent body, tubed covering which covers the side face of this stent body, and this tubed covering so that said stent body might not be contacted. For this reason, there is no hypertrophy of the stanchion section of the stent body resulting from a marker, and the stent can be certainly grasped by X-ray imaging.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing 1 is the perspective view of one example of the stent of this invention.
[Drawing 2] Drawing 2 is the development view of the stent body of the stent shown in drawing 1 .
[Drawing 3] Drawing 3 is an explanatory view for explaining the spiral configuration of the frame structure object used for the stent of this invention.
[Drawing 4] Drawing 4 is an explanatory view for explaining the spiral configuration of the frame structure object used for the stent.
[Drawing 5] Drawing 5 is a sectional view in near the marker arrangement section of the stent shown in drawing 1 .
[Drawing 6] Drawing 6 is the perspective view of other examples of the stent of this invention.
[Drawing 7] Drawing 7 is a sectional view in near the marker arrangement section of the stent shown in drawing 4 .
[Drawing 8] Drawing 8 is the perspective view of other examples of the stent of this invention.
[Drawing 9] Drawing 9 is a sectional view in near the marker arrangement section of the stent shown in drawing 8 .
[Drawing 10] Drawing 10 is the perspective view of other examples of the stent of this invention.

[Drawing 11] Drawing 11 is a sectional view in near the marker arrangement section of the stent shown in drawing 10 .
[Description of Notations]
1 Stent for Detention in the Living Body
2 Stent Body
3 Tubed Covering
5 Marker

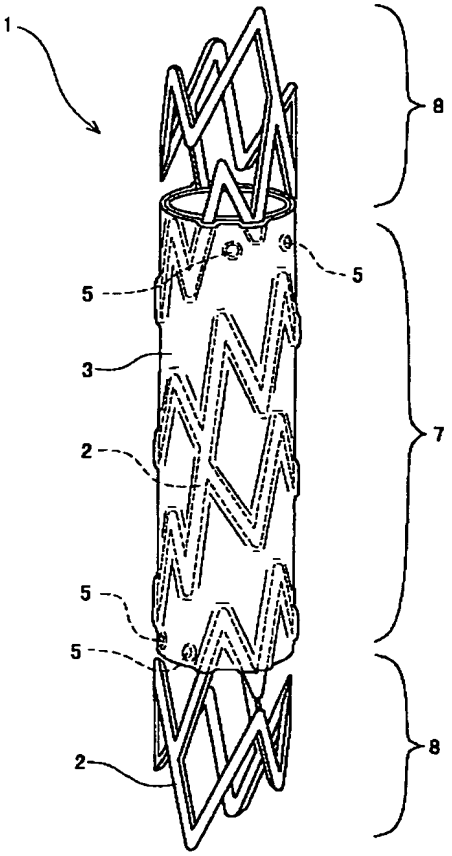
[Translation done.]

* NOTICES *

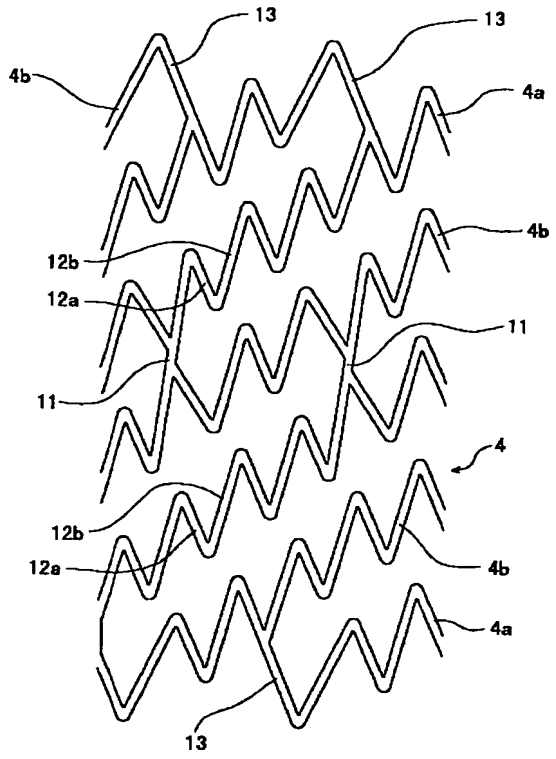
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

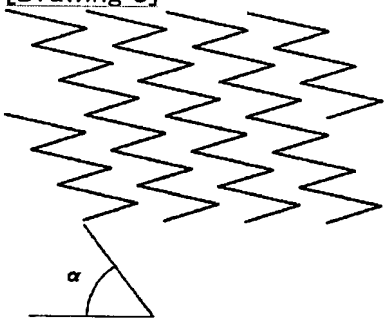
[Drawing 1]



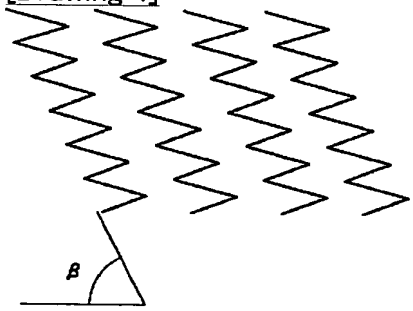
[Drawing 2]



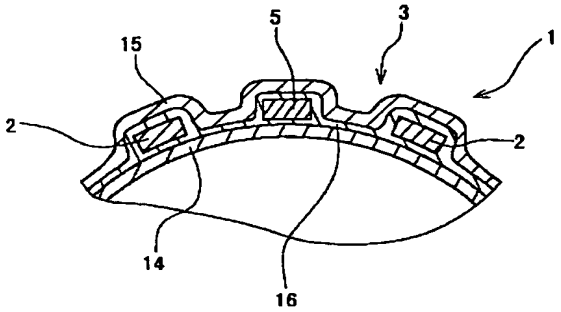
[Drawing 3]



[Drawing 4]



[Drawing 5]



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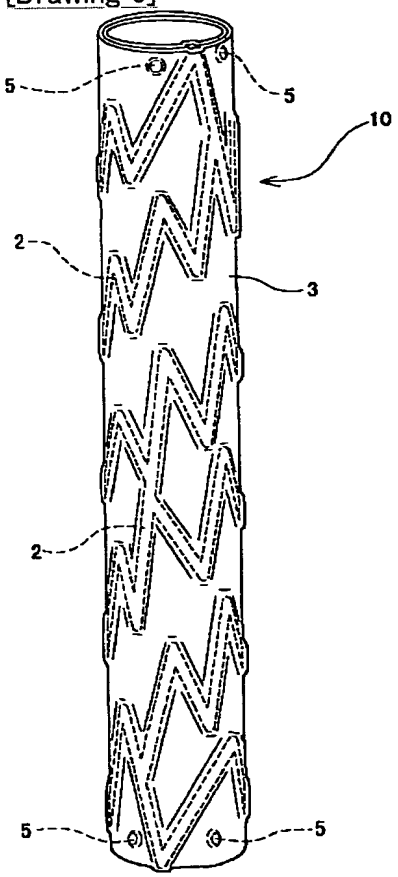
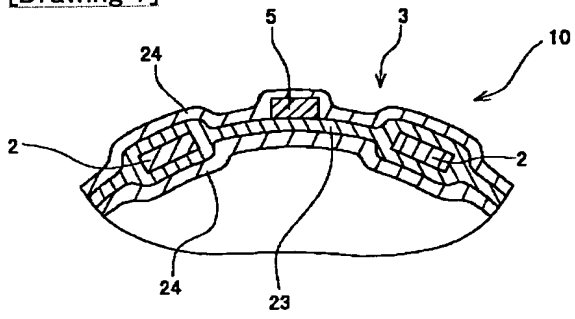
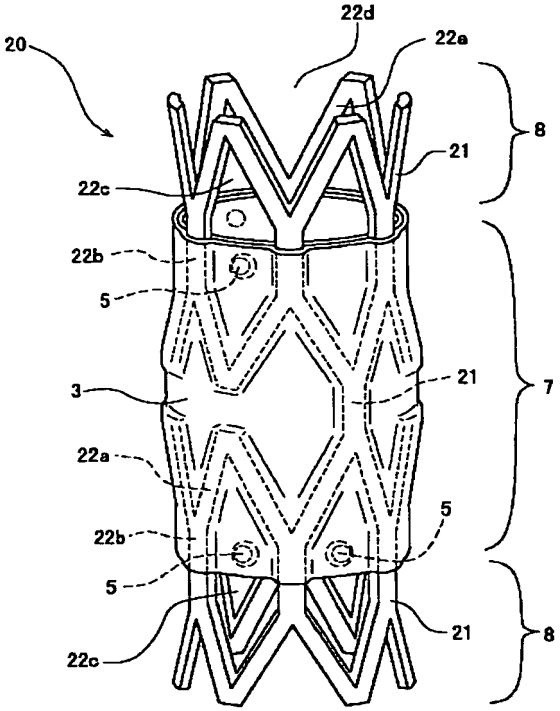


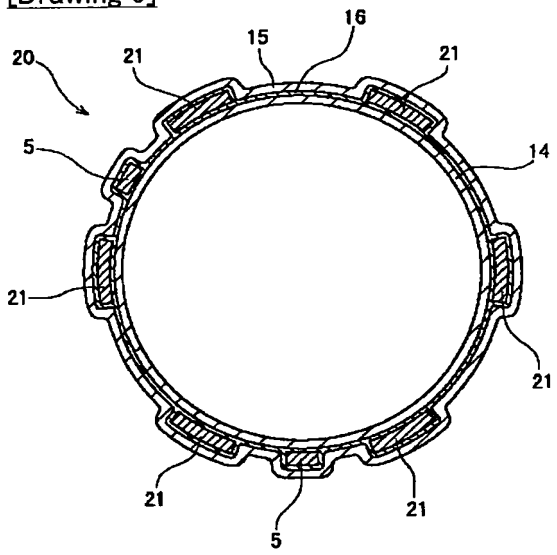
[Drawing 7]



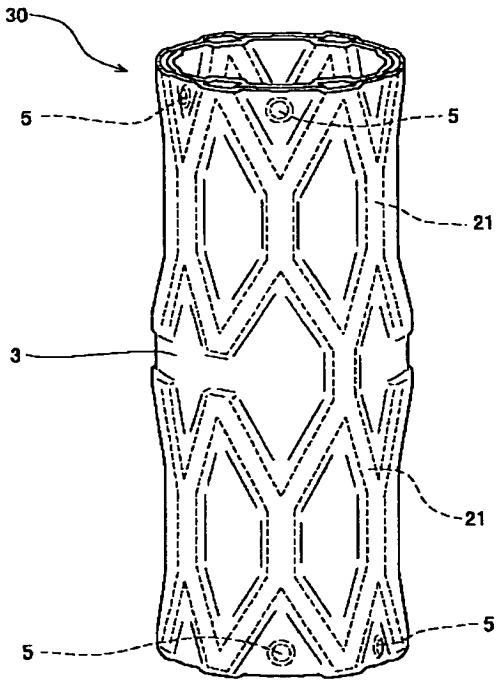
[Drawing 8]



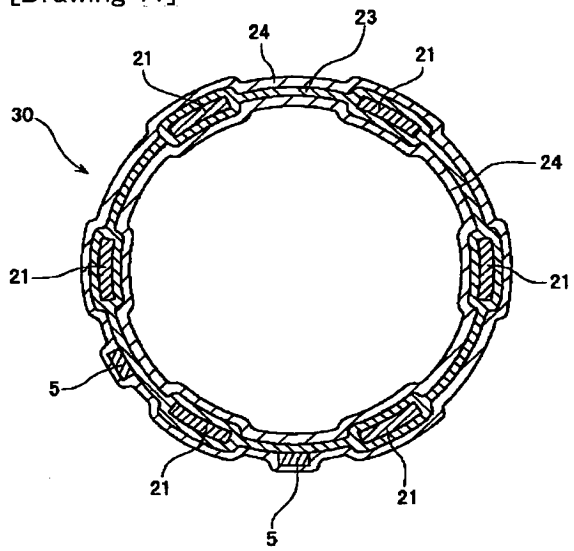
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]